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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/713,215	11/16/2000	YASUNAGA KAYAMA	107314	2926

25944 7590 06/04/2004

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EXAMINER	
KIM, PETER B	

ART UNIT	PAPER NUMBER
2851	

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/713,215	KAYAMA, YASUNAGA	
	Examiner	Art Unit	
	Peter B. Kim	2851	

-- The MAILING DATE of this c mmunication appears on the cover sheet with th correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-7,9-11,14-18,20-24,26,28-30,32-36,38,40-46 and 48-68* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,7,9-11,14,15,18,20-24,26,28,30,32-36,38,40,42-46,48-52 and 54-68* is/are rejected.

7)☒ Claim(s) *16,17,29,41 and 53* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *42004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on Apr. 28, 2004 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 56-63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 56, the structural relationship between "a plate" and the flange is not clear. According the written description, the piezoelectric elements are coupled to the flange (ref. 34), but the claim language is drawn to the elements in "the plate."

The remaining claims, not specifically mentioned, are rejected for incorporating the defects from the base claim by dependency.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-7, 9-11, 14, 15, 18, 20-24, 26, 28, 30, 32-36, 38, 40, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akimoto et al. (Akimoto) (6,359,688) in view of Hayashi (6,036,162) and Takahashi et al. (Takahashi) (6,008,885).

Akimoto discloses an exposure apparatus and a method of making an exposure apparatus and a method of exposing a pattern of a reticle (7) onto a substrate or an object (W), with a projection system (PO), a holder (not shown) to hold the projection system, acceleration detector (16Uy, 16Dy) located on the projection system to detect information concerning displacement of the projection system, an actuator (34), a driver connected to the actuator to drive the actuator in response to detection results of the detector (Fig. 2). Akimoto also discloses actuator including piezoelectric elements (col. 12, lines 13-16), a mask stage (8, 9) for holding and moving the mask, and a substrate stage or an object stage (12, 15) for moving and holding the substrate or the object. Akimoto discloses a driver (31, 33) connected to the actuator to drive the actuator (Fig. 2). However, Akimoto does not disclose the actuator arranged on the holder for holding the projection system arranged on a relatively weak part of the holder. Akimoto also does not disclose the actuator mounted on an adapter plate that is releasable, a supporting member that supports the projection system and a damper which isolates the projection system from one of the substrate and the reticle stage. Akimoto does not disclose a distortion sensor.

Hayashi discloses in Figure 7, an exposure apparatus and method where the actuators (235) are located in the holder (224) and the acceleration detectors (232) are located on the holder. Hayashi also discloses the support member (Fig. 7, column or legs supporting the holder 224), which supports the projection optical system, but does not support the substrate stage

(220). Hayashi discloses the actuator mounted on an adapter plate (231), which is releasable and located at a relatively weak part of the holder (Fig 7, 231C). Hayashi also discloses a detector which is a distortion sensor (col. 20, lines 36-45). Takahashi discloses in Fig. 1, an exposure apparatus with a support member supporting the projection system (2), which does not support the substrate stage, and a damper (11) that isolates the projection system from the stage (6).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the actuators on the holder and the acceleration detectors on the holder as in Hayashi and the damper which isolates the supporting member from the substrate stage as in Takahashi in order to reduce deformation of the apparatus and effectively suppress the vibration with high degree of accuracy as taught by col. 4, lines 52-64 and to reduce the effect of displacement of the stage on the scanning operation as taught by Takahashi in col. 1, lines 39-60.

Claims 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akimoto et al. (Akimoto) in view of Hayashi and Takahashi as applied to claims 1, 18 and 30 above, and further in view of Watson (5,959,427).

The further difference between modified Akimoto and the claimed invention is the exposure apparatus comprising a compensatory driving system that applied compensatory force to the stationary part of the object stage drive system. Watson discloses in Figure 3, an object stage drive system that includes movable part and stationary part and a compensatory driving system applies force to stationary part of the stage drive system and a compensatory driving system (60, 62) that applied force to the stationary part. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a compensatory driving

system to the invention of Akimoto in order to ensure that there is no uncancelled reaction moment and no disturbance of the base stability (the abstract of Watson).

Claims 1, 3-7, 9-11, 14, 15, 18, 20-24, 26, 28, 30, 32-36, 38, 40, 45, 46, 48-52, and 54-68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamoto (5,781,277) in view of Akimoto et al. (Akimoto).

Iwamoto discloses an exposure apparatus and a method of making an exposure apparatus and a method of exposing a pattern of a reticle (R1) onto a substrate or an object (W1), with a projection system (7), a holder (Fig. 1) to hold the projection system with a flange (Fig. 1), a mask stage (9) for holding and moving the mask, and a substrate stage or an object stage (6) for moving and holding the substrate or the object. Iwamoto discloses a support member (3a) that supports the projection system by the holder, the substrate stage is not supported by the support member (Fig. 1), and a damper (20) that isolates the projection system from the stage. Iwamoto also discloses a support member (3a) having at least one of a plurality of hold members and a plurality of notch members (Fig. 2-6). However, Iwamoto does not disclose an actuator having a pair of piezoelectric element coupled to the holder and actuates the holder in a two dimensional plane perpendicular to an axis of the projection system.

Akimoto discloses an exposure apparatus and a method of making an exposure apparatus and a method of exposing a pattern of a reticle (7) onto a substrate or an object (W), with a projection system (PO), a holder (not shown) to hold the projection system, acceleration detector (16Uy, 16Dy) located on the projection system to detect information concerning displacement of the projection system, an actuator (34), a driver connected to the actuator to drive the actuator in

response to detection results of the detector (Fig. 2). Akimoto also discloses actuator including piezoelectric elements (col. 12, lines 13-16), a mask stage (8, 9) for holding and moving the mask, and a substrate stage or an object stage (12, 15) for moving and holding the substrate or the object. Akimoto discloses a driver (31, 33) connected to the actuator to drive the actuator (Fig. 2). Hayashi discloses in Figure 7, an exposure apparatus and method where the actuators (235) are located in the holder (224) to actuate the holder in a two dimensional plane (col. 19, lines 25-57) and the acceleration detectors (232) located on the holder. Hayashi also discloses the support member (Fig. 7, column or legs supporting the holder 224), which supports the projection optical system, but does not support the substrate stage (220). Hayashi discloses the actuator mounted on an adapter plate (231), which is releasable and located at a relatively weak part of the holder (Fig 7, 231C). Hayashi also discloses a detector which is a distortion sensor (col. 20, lines 36-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the actuators on the holder and the acceleration detectors on the holder as in Hayashi and the detector and an actuator of piezoelectric element of Akimoto in order to reduce deformation of the apparatus and effectively suppress the vibration with high degree of accuracy as taught by col. 4, lines 52-64 of Hayashi and to reduce the effect of vibration of the projection optical system as taught by Akimoto in col. 6, lines 23-32.

Allowable Subject Matter

Claims 16, 17, 29, 41, 47 and 53 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant argues that Akimoto does not teach piezoelectric element coupled to a projection system holder and actuate the holder in a two dimensional plane. However, Hayashi reference teaches the limitation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter B. Kim whose telephone number is (571) 272-2120. The examiner can normally be reached on 8:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Peter B. Kim
Primary Examiner
Art Unit 2851